

seems to be a survival of a rite of actual fire sacrifice. In some cases the juice of the *Aloe indica* is said to be used as a protective, but Mr. Thurston seems to believe that the indurated skin on the soles of men who habitually walk barefoot over the roughest ground accounts for many cases of immunity. A recent description by Mr. D'Penha of the rite as it is performed at Travancore indicates that the length of time which is allowed to expire between the lighting of the fire and the actual walking makes it an operation of little danger. Mr. Partridge, who witnessed the ceremony at Ganjam, describes the priest as going to the fire-pits, "which were a mass of red-hot ashes; he sprinkled not more than a handful of incense on to them; dipped his feet in a mixture of rice-water and milk; and walked across one pit, leading another man. He then dipped his feet again in the fluid mixture, and returned by the other pit. The time he took in walking across one pit was not more than four seconds, and he took about four steps on the ashes. At least fifty persons in the crowd walked over the pits afterwards, but they went a little faster than the priest, and some of them only took two steps on the ashes. Their feet were not hurt, and they did not wash them in any mixture before or after they went over the ashes. I infer from the way in which the performance was conducted that anyone can easily walk over the ashes, but that, if he goes like the priest, he must dip his feet in the mixture both before and after walking across them." Mr. Risley, on the evidence from Bengal, came to the conclusion that when a narrow trench is used in the rite, it is possible for an active man to place his feet so rapidly on the edges of the trench that he does not actually touch the burning cinders, and escapes injury. Probably many performances of the rite may be explained in this way.

The chief ethnological curiosity of the museum is the Meriah sacrificial post from Ganjam, used in the blood sacrifices of the Khonds, of which the illustration is here reproduced (Fig. 2). It has suffered much damage from white ants, and its original form is not easily recognisable. It seems to represent the proboscis of an elephant to which the victim was bound. This, according to General Campbell, was one of the most common forms.

Mr. Thurston's book is arranged without any method, but it contains a mass of curious information which will make it welcome to European ethnologists.

MEDICAL SCIENCE AND ARMY EFFICIENCY.

IN spite of the natural interest which the nation takes in the Army, few people realise completely what is the work that the Royal Army Medical Corps has to do, how vast are the responsibilities committed to it, and how dependent army efficiency is upon medical science. It is difficult to explain this want of interest and knowledge, but it arises probably from the fact that much of the work which the medical service does in the Army, both in peace and war, is of an unostentatious nature, and lacks the pomp and glamour which appeal so strongly to a public when associating itself with the military organisation of the country. Apart from this, the medical service suffered for many years under grave official disabilities, being systematically snubbed, and its professional and military pride injured. Such an attitude on the part of highly-placed persons in the military bureaucracy could not fail to dishearten its *personnel* and lessen any general enthusiasm or interest in its work by the general public. To a large extent these mistakes of

the past have been rectified, and the army medical service desires now, as it ever has done, to do its duty and to deserve well of the country; but it recognises that to do this it must advance and utilise fully the progress of science and the increasing knowledge of the profession of medicine which it represents in the military machine. Before attempting to explain these aspirations, it may not be uninteresting to readers of NATURE to sketch briefly the evolution of the army medical service from less enlightened times to the present day.

The need of medical attendance with an army in the field seems to have been always more or less recognised. In the days of the early Edwards, physicians and surgeons are recorded as having formed part of the levies which were taken into the field; but until the sixteenth century the proportion of such men to the whole force was very small, and even in the time of James I. we find no allowance or provision in the estimates for medicines or hospital appliances; these details were supposed to be found by the surgeons themselves, for the cost of which a weekly stoppage of 2d. was made from the pay of the private soldier. It is not until the time of Marlborough that we find any sign of prominence being given to the medical service of the Army, but it was nearly fifty years later that the first reforms in military medicine and sanitation were introduced by Sir John Pringle, when physician-general to the forces in Flanders. The long series of wars in which England was engaged at the end of the eighteenth and the beginning of the nineteenth centuries produced many able men who left their mark on the organisation of the Army; not the least remarkable among them was Sir James M'Grigor, who, beginning his career as a military surgeon in 1793, became principal medical officer in Portugal and the Peninsula under Wellington, and finished his official career as medical director-general after the time of the great war. To him it was due that, in the service of which he was head, order was evolved out of chaos, and that the army medical service became an organised body, uniting in itself the best traditions of two professions.

In the long peace that followed Waterloo, our military machinery rusted from disuse or decay, notably the supplementary services which are necessary to form an army. The arrangements which had been made and the materials which had been collected in the old wartime for the care of the sick and wounded disappeared with nothing to replace them, and, when the Crimean War came, the best endeavours of the best men were powerless to grapple with the problems which were to be faced. The lessons of old experience had been forgotten, and the army medical service found itself helpless, without means to carry out even an antiquated system of professional duty. At that time the army medical service consisted only of officers, divided into two classes, staff surgeons and regimental surgeons, though the whole were borne on one list, and, up to a certain rank, were interchangeable. After a regimental surgeon had attained a certain seniority he was promoted to be a staff surgeon of the first class, and was employed thenceforth in superintendence and administration rather than in regimental or personal professional practice. Practically all the officers of the medical staff had at one time or another been regimental surgeons, and presented in varying degree the merits or demerits of that training. The system of gazetting medical officers to individual corps had many advantages, both socially and professionally, but it had undoubted drawbacks. The first and most important of these was that there was a constant difficulty in utilising them elsewhere than with their own corps, hence, if the public service

was to be carried out, the total number of surgeons to be maintained was excessive. Putting aside this question of economy and distribution of *personnel*, the system was extravagant owing to the hospitals being regimental also; this involved an unnecessary duplication of equipment, while, too, in many instances the regimental surgeons, by this limitation of their sphere of duty, had a tendency to drift into a quasiroutine method of professional practice.

In 1858, following the close of the Crimean War, came the Royal Commission under the presidency of Sidney Herbert. The immediate result of its report was the formation of the Army Medical School at Netley for the training of medical officers in military technical duties, also the re-modelling of the service and the initiation of practical reforms in the administration of military medical affairs, as well as the creation for hospital duties of the Army Hospital Corps, a body of men possessing a complete military organisation. In 1873 the system of regimental surgeons, except in the Guards, was abolished finally, and all medical officers were consolidated into one staff; at the same time disappeared also the regimental hospitals, their places being taken by general hospitals and station or field hospitals. From this date all regimental organisation ceased to exist, the arrangements for medical affairs passing into the hands of the medical officers alone. In 1877 authority was given to medical officers to command the whole of the Army Hospital Corps, and also all patients in military hospitals, as well as other soldiers attached to them for hospital duty. From this date the medical officers became invested with the responsibilities as to discipline, training, supply, payment, and movement of their own subordinates, similar to the responsibilities resting upon a commissioned officer in any other branch of the service. In 1885 the appellation of the Army Hospital Corps was changed to Medical Staff Corps, and in 1898 the Medical Staff and the Medical Staff Corps were further consolidated into an autonomous whole as the Royal Army Medical Corps of the present time. As a necessary sequel to the functions and responsibilities of the Corps in its new organisation, its officers were given full army rank and title, thus completing the evolution of the medical service from the chaotic state when its *personnel* were mere camp followers endowed with neither official status nor responsibility to the completely autonomous and purely military organisation of to-day. These recent reforms have embraced the granting of good pay, liberal terms of service and study, with the abolition of the archaic school of instruction at Netley and the substitution of a Royal Army Medical College in London, where the officers of the Corps are brought into intimate touch with the newest theories and practice of medicine. In a word, the liberal and far-seeing policy of those responsible for the reforms of 1899 to 1902 has revolutionised the position and *moral* of the Corps, with the result that its 1002 officers and 4189 non-commissioned officers and men constitute a contented and thoroughly efficient body of technically trained men, equipped and able to meet the needs of the sick and the wounded.

Is the task ended? it may be asked, and have we reached finality in our efforts to build up a medical corps at once worthy of the country and the Army of which it is an integral unit? Unfortunately no; there is much yet to be done. Military history has, up to to-day, been a history of the battle only, of brave deeds done and suffering bravely borne; but what of the history of the means by which armies were rendered numerically efficient and placed in a condition to fight? We have faced the problem of how to treat and provide for the sick and wounded, and

unhesitatingly compel our commanders to encumber their fighting force with *impedimenta* and medical provision for 10 per cent. of sick; but need this be? The two great scourges of armies in the field are enteric and dysentery. During the late war in South Africa, these two diseases alone caused 74,000 admissions to hospital and 9200 deaths. Yet both diseases are largely preventable. It is no exaggeration to say that for every man wounded in war twenty sick men are brought to hospital, largely from preventable causes. The unopposed crossing of the Modder River lost us more men from enteric than the battle of Colenso lost us from wounds. Surely if this enormous waste of fighting strength is avoidable, the prevention of sickness and disease in a field force is of more importance than the mere treatment of its victims. Thanks to the evolution in its organisation and perfection of equipment which the Royal Army Medical Corps now presents, the soldier of to-day has a better chance of recovery than the sick or wounded man of the Peninsular or Crimean Wars; but the same cannot be said of the soldier's chances of contracting preventable disease, for the organisation and equipment of the British Army as to disease prevention remain little better than they were a hundred years ago. The reason of this is, that army administration (medical) has not kept pace with the advance of science, and has neglected to note early the influence of Pasteur's work upon the problem of war. This, then, is the task still before the army medical service—how to translate scientific knowledge into an administrative system for the efficient prevention of disease among troops in the field. This would be easy enough if no regard were paid to the necessities of mobility and supplies, but those are points which we cannot ignore; in fact, the whole object and aim of sanitary effort is to increase fighting efficiency and lessen transport; therefore, in our campaign to reduce the incidence of preventable disease, we need to be careful not to add *impedimenta* to the Army with one hand even though we take some away with the other.

It is to the solution of this problem that the medical corps of the Army is now devoting itself, and the principles on which it is working are briefly these:—(1) the Army at large, from highest to lowest, must be educated to appreciate the need of radical reforms in the direction of preventing disease, and to understand that these cannot be secured "by order" only, but require personal effort on the part of each individual and the recognition by officers of their own direct responsibility for the health of their men; (2) the elaboration of an organised system for providing safe and potable water for all troops when in camp or on field service. The practical application of the first principle has taken the form of systematic instruction in the various garrisons of all ranks in elementary sanitation. These classes are conducted by officers of the Royal Army Medical Corps, whereby the importance of personal effort on the part of both officers and men is enforced and the special training of a certain number of men in practical sanitation secured, so that each unit may have its own sanitary squad for these special duties. Having these trained men at their disposal, it is hoped that commanding officers will find no future difficulty in the maintenance of their own lines and camps in conditions of sanitary efficiency. For the provision of safe and approved water to each unit in the field the Royal Army Medical Corps proposes to take full responsibility, and to this end every water-cart, every filter, every heat steriliser, and all chemical reagents for the routine purification of water will be in the charge of, and worked by, trained men of the Medical Corps.

Experience has shown that to hand this kind of equipment over to other than specially trained men is certain to end in failure. For the training of these men in methods of water purification the new School of Army Sanitation has been established at Aldershot, where special provision is provided for practical instruction in every method and the working or trial of any new apparatus or chemical technique adapted for army needs. The success of this effort has been already remarkable, demonstrating not only the feasibility of purifying water for soldiers under field conditions, either by means of special filters, by heat exchange sterilisers or by chemical reagents, but also showing the fitness of the men of the Royal Army Medical Corps for this special work. The school is utilised also for instruction of men from every branch of the service in general sanitary duties, and in this two-fold way constitutes a centre for the dissemination of practical sanitary knowledge and work to the whole Army.

It is early yet to say what will be the final result of this attempt, but everything points to the conclusion that the incidence of preventable disease in time of war must and will be reduced thereby. It is gratifying, further, to record the sympathetic support which the movement is receiving from a large number of general officers, commanding officers, and others outside the medical corps; but there is much leeway to be made up and much apathy and inertia to be overcome. This will be done only by the support of public opinion and interest, particularly of the scientific public. Possibly this outline of the present position may appeal to them to see that the scheme of work here sketched out has free scope and opportunity to evolve itself; in other words, that medical science is applied logically to the attainment of army efficiency, and that disease prevention is regarded as much a function of the medical corps as disease or wound treatment.

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THE METRIC SYSTEM OF WEIGHTS AND MEASURES IN THE COLONIES.¹

THE question of the introduction of the metric system of weights and measures into the United Kingdom has been before the public for more than forty years. An important step in this direction was taken in 1897, when the Weights and Measures (Metric System) Act was passed which rendered it lawful to use metric weights and measures in this country for the general purposes of trade. The trading community as a whole has not, however, manifested any eagerness to take advantage of this permissive legislation, and, so far as retail trade is concerned, the use of the metric system appears to be restricted to dispensing chemists and a few vendors of lager beer. It is true that for some years past the system has been allowed to appear in the official syllabus of our public elementary schools, but no stress is laid upon it there, and its chief recommendation is represented as being "the advantage to be gained from uniformity in the method of forming multiples and sub-multiples of the unit."

But although the metric system has made little progress in this country, and has met with scant official encouragement, the importance of its universal adoption is becoming every year more fully recognised in our colonies. The report which forms the subject of this article is a very clear indication of the strong current of public opinion in the Transvaal in favour

of the general adoption of the system. The commissioners, of whom Mr. R. T. A. Innes, the well-known Government meteorologist, was chairman, recommend that the kilogram, the metre, and the litre be adopted as the basis of the standards of weight and measure in the colony. An important resolution, which will go far towards making the public familiar with metric weights and measures, is that it shall be compulsory to use the system in land surveying and in the retail sale of drugs. The opinion is expressed that it will not be practicable to insist upon the exclusive use of the metric system in general trade in the colony until the system is made compulsory in the United Kingdom, unless the other South African colonies consider it, feasible to combine for the purpose.

The commissioners have made a careful survey of the question of weights and measures legislation, and their recommendations are embodied in a final draft ordinance the provisions of which are in many respects a distinct advance on the enactments in force in this country. Thus the definition of "trade" explicitly includes contracts for land, and so renders surveyors' measures liable to official verification. In the United Kingdom, surveyors generally test their own measures as best they can. The definition of "measuring instrument" includes instruments for the measurement of area. A similar provision in this country would be most beneficial to the leather trade in preventing disputes, now of frequent occurrence, especially in the sale of hides. Short weight and measure, and the practice of weighing the wrappers with goods sold, are made distinctly penal. People defrauded by these practices in the United Kingdom have to seek their remedy in the county court, or in a prosecution for false pretences.

It appears from the minutes of evidence appended to the report that much difficulty is experienced in the Transvaal in getting assay weights standardised with accuracy, especially weights from 10 mg. downwards. Certificates obtained some years ago from official institutions in Austria, England, Germany, and the United States were found to give very different values for the same set of proportional assay weights. So far at least as England and the United States are concerned, it is probable that at the period in question the standardising institutions had had but little experience in the verification of metric assay weights. Within the last few years, however, both these departments have been materially strengthened. The recent report of the newly-constituted Bureau of Standards at Washington sufficiently attests the high calibre of the scientific members of the present staff, whilst a corresponding improvement has been effected in this country by the appointment of Major P. A. MacMahon, F.R.S., to take charge of the Standards Department of the Board of Trade.

At the forthcoming colonial conference the importance to our colonies of the adoption of the metric system of weights and measures throughout the Empire will be urgently impressed upon the Secretary of State, and it is hoped that the Home authorities will be induced to take a greater interest in this question than they have hitherto evinced. The introduction of the metric system into the United Kingdom is not indeed a task to be lightly undertaken. It would involve much hardship to small traders, and would derange the habits of the whole trading community. Centuries of instruction in the "advantages of uniform multiples of the unit" would not prepare the nation for so great a sacrifice. When so little has been done by the authorities to familiarise the public with the real significance of the question, it is not surprising that public opinion is on the whole unripe for

¹ "Report of the Commission appointed to consider and report upon a Draft Ordinance to consolidate and amend the Law relating to Weights and Measures." (Pretoria: Government Printing Office, 1906.)